"Building Capacity Through Collaboration": COSEE-Ocean Systems (OS) Kick-off Meeting
Tuesday, October 26, 2010

Executive Summary: In October 2010, COSEE-OS received an additional three years of funding from the National Science Foundation (NSF). The "Kick-off" meeting was designed to spur ideas among key members of the target constituency and "put faces to names" as the enterprise moves forward. The morning breakout sessions focused on identifying needs and expertise among groups with various backgrounds (e.g., scientists, classroom teachers, informal educators, etc.). Common ideas emerged from the three groups: 1) Integration of authentic ocean sciences data/content into classrooms' existing curricula; 2) Facilitating strategic "match-making" of participants (e.g., educators/students learning ocean sciences from faculty/grad students, scientists learning effective teaching techniques from educators, engaging diverse audiences, etc.); 3) Providing high-quality opportunities for immersive learning; and 4) Testing and refining web-based technologies to deliver cutting-edge ocean sciences content and promote sustained interactions among partners. Based on the outcomes of the morning sessions, afternoon discussion groups tackled three topics: 1) Scientists interacting with formal educators; 2) "Students" (of all ages) interacting with scientists; and 3) Technology-mediated interactions. *Each of these groups had specific "Recommendations" that are shown in text boxes on Pages 4 and 5 of this document.* Over the next three months, COSEE-OS Staff will contact specific collaborators to discuss implementation strategies for these recommended actions.

Structure of the Meeting

The meeting included time for introductions, an overview of the COSEE Network, and a review of past COSEE-OS accomplishments and evaluation efforts. Time was also spent highlighting the ROLE (Research-based Online Learning Event) model webinar series and Center-developed software tools. These pieces set a stage for how the partners might collaboratively accomplish the goals of promoting ocean science education and deepening scientist engagement in education and public outreach efforts. Key meeting outcomes were developed during the breakout sessions described below.

Breakout Session 1

The goal of the first breakout session was to help partners learn about each other, begin making connections, and begin brainstorming ideas for possible collaboration. In each group, people were asked to respond to three questions: "What things can your organization offer to other partners?"; "What help would you like to receive from others?"; and "Who is your target audience?" Each group included a mix of representatives from formal education, informal education, graduate programs, research labs, and non-profit organizations. Despite a broad diversity of expertise in the groups' composition, common themes emerged as participants shared their programs and services offered and what they needed from others.

Group 1

Participants: C. Brace, L. Darling, P. DiBona, C. Durette, A. Fauver, D. Fields, R. Hyde, M. Wiley, A. Young (Moderator: C. Companion)

One common theme from educators in formal education was that they were looking for ways to "do more with less" or integrate ocean sciences content into their own classrooms with respect to the educators' limits on time and energy. The group talked about potential connections between their unique situations including:

- Matching scientist education & outreach requirements with classroom and informal education opportunities;
- Utilizing the database of programs and participants offered at the Institute for Broadening Participation (IBP) to "match-make" programs to participants;

- Selecting high school students to participate in science-based projects such as Bigelow Laboratory for Ocean Sciences' "BLOOM" program;
- Teachers giving feedback to graduate students so that they can improve their teaching practices; and
- Finding ways to connect in the classroom using web tools to promote sustained interactions.

Outcomes: Teachers, scientists, and graduate students all said they were willing to provide some of their time or resources to accomplish some of these potential connections. Additionally, a graduate student commented on how flexible graduate student's time is - which may be easier to fit into the educator's busy schedules.

Group 2

Participants: C. Carnahan, P. Chick, J. Disney, S. Farnham, A. Palacz, T. Shyka, T. Taylor (Moderator: C. Herren)

Formal educators and scientists expressed a need to gain access to each other's target audiences (i.e., scientists would like to share their messages with K-12 educators and students, and educators welcomed more and sustained contact with the scientific community). The two groups talked about the lack of time being a huge challenge. There were several suggestions on how to make the interactions more efficient and productive including:

- Enrolling educators and students in some of Mount Desert Island Biological Laboratory's (MDIBL) and Seacoast Science Center's (SSC) established programs that already engage a range of scientists (within an appropriate education structure that includes unique stewardship, leadership, and conservation experiences);
- Asking COSEE-OS to facilitate "match-making" processes between educators and graduate students who may have more flexibility than their time-challenged science advisors/professors; and
- Employing "tried and true" distance learning technologies at the SSC to help bring remote classrooms and scientists together virtually.

Outcomes: Educators were willing to consider offering their classrooms as "test beds" for new curricula/products, but asked partners to remember their need to adhere to the Maine Learning Results. Graduate students looking for experiences "outside academia and the lab" like the idea of collaborating with a range of teachers and "students" to gain insights into education and communication techniques, which they see as assets in future job searches. NorthEastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) solicited help in identifying useful products and portals for their educational "end users" (informal and formal) and described some of the many "ocean weather" and "ocean health" datasets and products that could be made available by their scientists with COSEE-OS facilitation.

Group 3

Participants: C. Armbrecht, L. Detrick, S. Engstrom, R. Fowler, S. Gallant, S. Lindsay, T. Nadeau, R. Smith, B. Spitzer (Moderator: M. Steinman)

Target audiences included K-12 students, college students, classrooms, colleagues, the general public, and scientists. Two representatives in this group pointed out that their organizations (i.e., IBP and New England Ocean Sciences Education Collaborative, NEOSEC) did not fit neatly into either the university, formal or informal educator groups, and they saw themselves interacting in all those groups and settings. Participants identified the following as their groups' offerings:

- Information about ocean science research; science expertise; time (graduate students);
- K-8 opportunities; education and outreach; indoor & outdoor programs and products; teacher opportunities; NEOSEC's broad network of institutions; dissemination of tools/ideas;
- Pedagogy expertise; diverse socioeconomic populations; organized, good labs, willing capable staff; and

- Recruitment best practices; mentoring, outreach, and funding for diverse audiences; networking support.

Regarding things their groups needs, participants indicated the following:

- Information on how to communicate science and research and make it portable to schools; achieving a seamless pipeline through all grade levels; understanding teacher needs; professional development support around broader impacts (graduate students);
- Support adding "real" science and cutting edge information to programs, exhibits; engaging scientists; conducting citizen science; learning new tools;
- Trying to find connections w/COSEE for formal educators; new funding and opportunities for students; research projects with real data; exposure to resource providers; and
- Understanding COSEE opportunities in relationship to the needs of faculty members.

Outcomes: Like other Groups, the participants expressed willingness to provide time and/or resources to facilitate connection and collaboration. Researchers are looking for help in reaching students with their science whereas educators (formal and informal) would like access to cutting-edge data and information that scientists can provide. Graduate students are seeking support in building communication skills for varied audienes.

Breakout Session 2

People were asked to choose form one the topics listed below and convene with that group. This session built on the first breakout session by offering a forum in which people could continue exploring possible areas of collaboration, identify needs, and brainstorm about tools, methods, and approaches.

Group 1- ***Topic: Scientists interacting with formal educators***

Participants: J. Disney, C. Durette, R. Fowler, S. Gallant, S. Lindsay, T. Nadeau, M. Wiley (Moderator: M. Steinman)

The discussion focused on two main areas. The first concerned questions about what defines high-quality "Broader Impacts" (BI). There was general agreement in the group that broader impacts "best practices" have not yet been developed and there has been limited guidance from NSF on the subject. The question was raised about whether COSEE-OS may be able to play a helpful role in identifying or disseminating best practices information. Members offered examples of specific programs that they felt modeled effective BI practices including:

- Jackson Lab—bacteriology unit for 2nd grade curriculum;
- MDIBL Ecologist-in-Residence program;
- Human genome project visiting schools;
- Vital Signs program of the Gulf of Maine Research Institute; and
- KIDs Consortium (www.kidsconsortium.org).

Recommendation: COSEE-OS could help identify and disseminate "BI best practices" with special emphasis on regional programs and partners.

A second area of discussion concerned "good fit" between researchers and educators who are engaged in broader impacts of science. Members agreed that successful scientist-educator engagement depends, to a significant degree, on individuals' degrees of motivation: scientists need to be motivated to do education/outreach and educators need to be proactive in collaborating with scientists. Some participants stated a need for "match-making" scientists and educators who fit the other's needs. Also mentioned was the idea of a possible weekend training bringing "pre-matched" scientists and educators together to develop specific work plans for their collaborations. Other groups were identified as important "players" in education and outreach efforts:

- Administrator buy-in is crucial (K-16 levels);

- Increasing numbers of "hybrid" experts who understand science research and education related to science, technology, engineering, and mathematics (STEM);
- Graduate students and even undergraduates; and
- Retired scientists.

Recommendation: COSEE-OS could be a facilitator for matchmaking, training sessions, and building support among broad communities of scientists (from undergraduates through retirees), K-16 educators and administrators, and experts in STEM.

Group 2 - *Topic: "Students" (of All Ages) Interacting with Scientists*

Participants: C. Carnahan, P. Chick, L. Darling, P. DiBona, S. Farnham, D. Fields, R. Hyde, A. Palacz, R. Smith (Moderator: C. Herren)

This group talked about issues and ideas that revolved around three main themes: (1) "Humanizing scientists"; (2) Realities in the classroom regarding curriculum development; and (3) Misconceptions about science content, scientists, and the scientific process.

Humanizing scientists

- Identified programs already in place with COSEE-OS partners that link scientists directly with "students" (learners of all ages);
- Educators crave more interaction between their students and scientists to make personal connections;
- Public perceptions (sometimes distrust) of science and scientists need to be addressed; and
- Direct interaction with scientists does have an impact.

Recommendation: COSEE-OS could create opportunities for teachers and students to informally meet with scientists.

Realities in the classroom: How to integrate ocean topics in the school science curriculum?

- Help inform scientists about state learning standards (not just national) and their importance to teachers; and
- Knowing your audience is very important—start with what's familiar to them and use "cool hooks."

Recommendation: COSEE-OS could investigate methods for providing concise bridges to learning standards and helping scientists link their science topics to these standards.

Ways to address misconceptions about science content, scientists, and scientific process

- Present age/grade-appropriate material, to guard against losing students' interest;
- Use publications like Page Keeley's "Curriculum Topic Study" to inform scientists about cognitive development and help them tailor their messages appropriately;
- Offer examples that counter the misconceptions that "you need a Ph.D. to do science" (e.g., feature the wide range of people with varied skills and talents who contribute to science products and outcomes); and
- Focus less on academic performance levels and more on student preparation by creating resources and/or techniques for engaging students with various learning styles

Recommendations: COSEE-OS could play a role in: 1) Investigating ways faculty/educators can help students explore a range of science-related career options; 2) Facilitating the "match-making" of enthusiastic students with scientists (e.g., grad students); and 3) Providing professional development for graduate students by helping them build pedagogical knowledge and skills.

Group 3- *Topic: Technology-Mediated Interactions*

Participants: C. Armbrecht, C. Brace, L. Detrick, S. Engstrom, A. Fauver, T. Shyka, B. Spitzer, T. Taylor, A. Young (Moderator: C. Companion)

There were two points of focus for the discussion: 1) Ways that tools can be used to help teachers, scientists and other members of COSEE partnerships connect with each other; and 2) Ways that tools can be used to sustain those relationships and collaborations. The tools and ideas that were mentioned could be used to accomplish either or both goals and included the following:

- Webinars featuring scientist presentations;
- Trainings/workshops for educator on new tools;
- Video presentations by scientists/graduate students;
- Access to ratings/comment on resources would help people identify appropriate ones for their needs;
- "What you do" video series/video journals about graduate students;
- Webcams at sites of interest;
- Access to buoy data;
- Blogs from the field;
- "Prezi" or similar tools for driving narratives;
- Linking coastal schools with inland schools in sustained interactions;
- Podcasts or webcasts about best practices; and
- Google Docs for sharing citizen science activities and data.

Recommendation: COSEE-OS could grow and expand its web-based tools and online events to include new features such as ratings/comments on resources, video presentations from scientists, video and science instrument data streams, sharing of best practices, and facilitating coastal/inland interactions.

COSEE- Ocean Systems Partners

** Denotes partner who was unable to attend kick-off meeting*

Bigelow Laboratory for Ocean Sciences (BLOS) (http://www.bigelow.org/) seeks to understand key processes driving global ocean ecosystems, their evolution, and their fundamental relationship to life on Earth. The Laboratory's research ranges from microbial oceanography — examining biological productivity and phytoplankton community dynamics in the world's oceans at the molecular level — to the large-scale biogeochemical processes that drive interactions between ocean ecosystems and global environmental conditions. Bigelow scientists are committed to sharing their discoveries with educators, students, and the public through a variety of programs, both at the Laboratory and within the regional community (e.g., Café Scientifique, Keller BLOOM Program for high school students, and Research Experience for Undergraduates).

- **David Fields** (Senior Research Scientist)
- **Rebecca Fowler** (Director of Education)
- * Nicole Poulton (Research Scientist)

Institute for Broadening Participation (IBP) (http://www.ibparticipation.org/) is a non-profit organization created to design and implement strategies to increase access to STEM (Science, Technology, Engineering, and Mathematics) education and careers for diverse underrepresented groups. IBP's mission is to make education and careers in science more accessible to students - particularly to members of underrepresented groups, support faculty and administrators as they work to include students from a variety of backgrounds in their programs, and foster an on-going exchange of ideas and resources between individuals and institutions who are working to navigate their future in the STEM fields.

- **Liv Detrick** (Assistant Director)
- **Allyson Fauver** (Policy Analyst, Media Specialist)
- * Ashanti Johnson (Executive Director)

Mount Desert Island Biological Laboratory (MDIBL) (http://www.mdibl.org/) offers a welcoming community energized by the excitement of discovery in research and education. MDIBL has grown rapidly over the past ten years with new investigators and state-of-the-art laboratory facilities, but they are committed to maintaining the unique atmosphere created by a small, diverse, collaborative, and open-minded cadre of leading researchers and students. With a commitment to preserving the marine environment and the belief that everyone needs to understand science, MDIBL's community extends beyond the world of scientific research. They are restoring marine habitat and engaging local school children and community volunteers in scientific activities that monitor and protect water quality, as well as offering programs throughout the summer that educate the public about the marine environment, genetics, and biomedical research.

- **Jane Disney** (Staff Scientist & Director of Community Environmental Health Laboratory)

New England Aquarium (NEAq) (http://www.neaq.org) is a global leader in ocean exploration and marine conservation. The Aquarium is one of the premier visitor attractions in Boston, with over 1.3 million visitors a year, and a major public education resource. The Aquarium is redefining what it means to be an aquarium: combining education, entertainment and action to address the most challenging problems facing the ocean. They are committed to engaging and educating the public through exhibits in Boston—but also in taking an active role in the world by building awareness and finding innovative solutions through marine conservation and research. NEAq has a plethora of programs and classes for families, members, teens, and adults, and also offers Aquarium Lecture Series on a range of current topics presented by scientists, authors and Aquarium staff members. NEAq supports teachers both at the Aquarium and in the classroom through field trip planning, classroom resources, school programs, professional development and a Teacher Resource Center.

- **Billy Spitzer** (Vice President of Planning, Programs & Exhibits; *also with NEOSEC*)

New England Ocean Science Education Collaborative (NEOSEC) (http://www.neosec.org/) is a diverse networked collaboration of more than forty institutions from across New England, including aquariums, museums, universities, government entities and science and research centers. NEOSEC's mission and collective purpose are to leverage New England's extraordinary assets to engage the public in understanding the vital connections between people and the ocean. The diversity of professional expertise, resources, locations, and audiences represented by NEOSEC enables us to facilitate strong connections between New England scientists and educators. They recognize that understanding the ocean is integral to comprehending the Earth's systems and life on this planet, and have identified Ocean Literacy as a key goal for all of New England.

- **Pam DiBona** (Project Manager; *also with the New England Aquarium*)

Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) (http://www.neracoos.org/about/mission.html) is a component of the national IOOS, spanning coastal waters from the Canadian Maritime Provinces to the New York Bight. Their mission is to make available information to those who use these waters. For example, they provide weather and ocean data to fishers and commercial shippers, and to emergency and resource managers issuing storm warnings, monitoring water quality, and forecasting coastal flooding and erosion. NERACOOS advocates through education and outreach for the regional, national, and global ocean observing system and the application of scientific assessments using environmental data to meet societal needs.

- **Cassie Durette** (Administrative Assistant)
- **Tom Shyka** (Outreach & Communications Specialist)
- * Ru Morrison (Executive Director)

School District Partners (K-12 Formal Educators) (http://www.maine.gov/education/) Three school districts in inland Maine are partnering with COSEE-OS: Bangor School Department, Alternative Organizational Structure 92 (AOS 92) in Waterville, and Maine School Administrative District #11 (MSAD #11) in Gardiner. Each school district has staff members who have interacted previously with COSEE-OS (e.g., professional development workshops). They will be teaming up with COSEE-OS to plan curriculum development workshops with regional scientists and to evaluate where ocean science content could be integrated into curriculum at all levels.

- **Corbin Brace** (Teacher grades 9-12; Winslow High School, ME)
- **Christine Carnahan** (Teacher grades K-5; Winslow Elementary School, ME)
- **Laurette Darling** (Teacher grades 4-5; Albert S. Hall School, Waterville, ME)
- **Sarah Farnham** (Teacher grades 6-8; Winslow Jr. High School, ME)
- **Sharon Gallant** (Teacher grades 9-12; Gardiner Area High School, ME)
- **Ricia Hyde** (Teacher grades 6-8; Waterville Jr. High School, ME)
- **Tom Nadeau** (Teacher grades K-8; Vassalboro Community Schools, ME)
- **Rose Smith** (Teacher grades 9-12; Waterville Sr. High School, ME)
- **Ted Taylor** (Teacher grades 9-12; Bangor High School, ME)

Sea Grant College Programs (http://www.seagrant.noaa.gov) Environmental stewardship, long-term economic development and responsible use of America's coastal, ocean and Great Lakes resources are at the heart of Sea Grant's mission. Sea Grant is a nationwide network (administered through the National Oceanic and Atmospheric Administration [NOAA]), of 32 university-based programs that work with coastal communities. The National Sea Grant College Program engages this network of the nation's top universities in conducting scientific research, education, training, and extension projects designed to foster science-based decisions about the use and conservation of aquatic resources. Their research and outreach programs promote better understanding, conservation and use of America's coastal resources. Specifically, Maine, New Hampshire and Oregon Sea Grant are partnering with COSEE-OS.

- **Mark Wiley** (Extension Specialist -Marine Sci. Educ.; NH Sea Grant & UNH Coop. Extension)
- * Esperanza Stancioff (Extension Educator; ME Sea Grant & UMaine Coop. Extension)

Seacoast Science Center (SSC) (http://www.seacoastsciencecenter.org), located in historic Odiorne Point State Park in Rye, NH, is a popular destination for families and students to learn about coastal environmental history. SSC creates connections to nature through personal learning experiences in the natural sciences, and offers a wide range of engaging and interactive programs and exhibits that appeal to all ages, backgrounds and learning styles. Each year, over 60,000 people visit the Center, 15,000 of whom are students from throughout New England. The $1M Gregg Interactive Learning Studio with two-way communication technology enables SSC to provide innovative, high-quality distance learning experiences to students throughout the state and across the country.

- **Perrin Chick** (Education Director)
- **Steve Engstrom** (Aquarist and Educator)

University of Maine School of Marine Sciences (UMaine) (http://www.umaine.edu/marine/) has a mission to develop scientific understanding of the marine environment that is Maine's heritage, to integrate and communicate that knowledge through interdisciplinary undergraduate and graduate studies, and to apply it toward stewardship of sustainable marine resources. The faculty is well known for its research over a broad spectrum of marine studies from molecular biology and biotechnology to fisheries science, economics and anthropology, and from marine geology and coastal engineering to aquaculture, marine ecology and oceanography. In fall 2010, the faculty will unveil a new interdisciplinary, case study- and web-based approach to graduate-level learning that will replace the classic introductory curriculum.

- **Sara Lindsay** (Associate Professor)
- **Carrie Armbrecht** (Graduate Student, *also with COSEE-Ocean Systems*)
- **Artur Palacz** (Graduate Student)
- **Ashley Young** (Graduate Student)
- * Esperanza Stancioff (UMaine Coop. Extension*; see also Sea Grant College Programs*)

University of New Hampshire's Marine Sciences Program (UNH) (http://marine.unh.edu/) integrates the marine research, education and public service activities of over 60 faculty, 300 undergraduate students and 100 graduate students from 14 departments and three colleges at the university. The Program serves as a catalyst for marine research activities at various levels from individual investigators to large interdisciplinary Centers of Excellence and Cooperative Institutes. Extramural support for this research also expands research opportunities for undergraduate and graduate students. In addition to these opportunities, the Marine Program retains a core focus on finding solutions to real-world problems and integrating these efforts into the formal classroom as well as public education and outreach efforts through Marine Docent and Sea Grant programs.

- **Mark Wiley** (UNH Cooperative Education*; see also Sea Grant College Programs*)

COSEE Ocean Systems (COSEE-OS) (http://cosee.umaine.edu) was established five years ago to help improve the scientific literacy of rural and inland communities through the development of innovative interactive products and processes. COSEE-OS is one of fourteen Centers for Ocean Sciences Education Excellence (COSEE) that together comprise the national COSEE Network (http://www.cosee.net) funded by the National Science Foundation. Each COSEE Center is a partnership that develops strong interactions between ocean research institutions, formal education organizations, and informal education providers. Each Center develops programs and educational materials that actively engage scientists, educators, students and the public in the excitement of ocean science. Since fall 2005, COSEE-OS has investigated issues in educational research that pertain to pedagogy, practice, and the learning process, as well as developed a suite of online multi-media tools that support these activities.

- **Annette deCharon** (Director)
- **Carla Companion** (Research Associate)
- **Christy Herren** (Research Associate)
- **Ted Repa** (External Evaluator)
- **Medea Steinman** (Marine Education Associate)
- **Lisa Taylor** (Research Associate)

For more contact info, please see **COSEE-OS Directory: http://cosee.umaine.edu/directory/**